PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 2 8 NOV 2005

WIPO   PCT

Applicant's or agent's file reference CL2125PCT	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. PCT/US04/10710	International filing date *(day/month/year)* 07 April 2004 (07.04.2004)	Priority date *(day/month/year)* 07 April 2003 (07.04.2003)

International Patent Classification (IPC) or national classification and IPC

IPC(7): G06K 9/00; G01N 21/00, 21/84 and US Cl.: 382/141; 356/435, 429

Applicant

E. I. DU PONT DE NEMOURS AND COMPANY

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of _5_ sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

   a. ☑ *(sent to the applicant and to the International Bureau)* a total of _3_ sheets, as follows:

   ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

   ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) _____ , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

   ☒ Box No. I   Basis of the report

   ☐ Box No. II   Priority

   ☐ Box No. III   Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

   ☐ Box No. IV   Lack of unity of invention

   ☒ Box No. V   Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

   ☐ Box No. VI   Certain documents cited

   ☐ Box No. VII   Certain defects in the international application

   ☐ Box No. VIII   Certain observations on the international application

Date of submission of the demand 04 November 2004 (04.11.2004)	Date of completion of this report 28 October 2005 (28.10.2005)
Name and mailing address of the IPEA/ US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Authorized officer Wupeng Chen Telephone No. 571 272 7431

Form PCT/IPEA/409 (cover sheet)(April 2005)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/US04/10710

Box No. I   Basis of the report

1. With regard to the **language**, this report is based on:

    ☒ the international application in the language in which it was filed.

    ☐ a translation of the international application into <u>English</u>, which is the language of a translation furnished for the purposes of:

    　☐ international search (under Rules 12.3 and 23.1(b))

    　☐ publication of the international application (under Rule 12.4(a))

    　☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

    ☐ the international application as originally filed/furnished

    ☒ the description:
    　pages <u>1-18</u> as originally filed/furnished
    　pages* <u>NONE</u> received by this Authority on _____
    　pages* <u>NONE</u> received by this Authority on _____

    ☒ the claims:
    　pages <u>18-22</u> as originally filed/furnished
    　pages* <u>NONE</u> as amended (together with any statement) under Article 19
    　pages* <u>18-18A</u> received by this Authority on <u>20 July 2005 (20.07.2005)</u>
    　pages* <u>NONE</u> received by this Authority on _____

    ☒ the drawings:
    　pages <u>1-13</u> as originally filed/furnished
    　pages* <u>9</u> received by this Authority on <u>20 July 2005 (20.07.2005)</u>
    　pages* <u>NONE</u> received by this Authority on _____

    ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

    　☐ the description, pages _____
    　☐ the claims, Nos. _____
    　☐ the drawings, sheets/figs _____
    　☐ the sequence listing *(specify)*: _____
    　☐ any table(s) related to the sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

    　☐ the description, pages _____
    　☐ the claims, Nos. _____
    　☐ the drawings, sheets/figs _____
    　☐ the sequence listing *(specify)*: _____
    　☐ any table(s) related to the sequence listing *(specify)*: _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

Form PCT/IPEA/409 (Box No. I) (April 2005)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/US04/10710

Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims <u>1-18</u>	YES
	Claims <u>NONE</u>	NO
Inventive Step (IS)	Claims <u>1-18</u>	YES
	Claims <u>NONE</u>	NO
Industrial Applicability (IA)	Claims <u>1-18</u>	YES
	Claims <u>NONE</u>	NO

2. Citations and Explanations (Rule 70.7)
Please See Continuation Sheet

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

. . Continuation of:

V. 2. Citations and Explanations:

1. Claims 1-18 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest the method of Claims1-2 and the apparatus of Claim 13.

a. For Claim 1, The prior fails to teach the method for measuring the degree to which a printed image on a first side of a sheet is visible when illuminating and viewing a second side of the sheet, the method specifically comprising:

-- creating a calibration image of a reference object containing no image by illuminating the reference object at an adjusted illumination level;
-- illuminating the sheet at an illumination level the same as that used to create the calibration image and creating an image of the sheet;
-- measuring the ratios of the pixel intensities of the image of the sheet with the corresponding pixel intensities of the calibration image;
-- calculating a mean value of the ratios of the pixel intensities.

b. For Claim 2, The prior fails to teach the image analysis method for characterizing the showthrough of a printed image on the reverse surface of a substantially planar sample object having a reflective front surface, by measuring the optical reflectance of the front surface with a lens and a photodetector array, the method specifically comprising:
(a) creating a frame-averaged dark current image representing the response of the photodetector array in the absence of light;
(b) uniformly illuminating, with a diffuse light source, the front surface of a reference object, said reference object having no image on its reverse, and creating a calibration image of the reference object, comprising the steps of:
-- (5) creating a frame-averaged reference image of the front surface of the reference object;
-- (6) creating a dark-current corrected calibration image of   the reference object by subtracting the frame-averaged dark current image of step (a) from the frame-averaged reference image of step (5) on a pixel by pixel basis and storing the resulting image in the memory;
(e) creating a dark-current-corrected image of the front surface of the sample object by subtracting the frame-averaged dark current image of step (a) from the frame-averaged image of step (d) on a pixel by pixel basis and storing the resulting image in the memory;
(f) analyzing the dark-current-corrected frame-averaged image by calculating the ratio of the image of step (e) with the image of step (b) (6) on a pixel by pixel basis to quantify showthrough.

Supplemental Box

    c.   For Claim 13, the prior fails to teach the apparatus for measuring the degree to which a printed image on a first side of a substantially planar sample object is visible when illuminating and viewing a second side of the substantially planar sample object, the apparatus specifically comprising:

    a) a light tight enclosure comprising a sample object holder, an illuminating assembly for diffusely illuminating the sample object, and an imaging assembly,

    b) a computerized image processing assembly for controlling the illumination level of the sample object created by the illuminating assembly and for receiving images created by the imaging assembly and analyzing those images, wherein

    -- the illuminating assembly comprises:

    (i) a hemispherical reflector positioned adjacent the sample   holder so that the predetermined sample plane corresponds to the equatorial plane of the hemisphere, the hemisphere having a diffusely reflecting interior surface and a polar opening for mounting the imaging assembly,

    (ii) a circular array of light sources positioned above the equatorial plane and arranged to illuminate the diffusely reflecting interior surface of the hemisphere;

    (iii) a photodetector positioned adjacent the array of light sources and oriented to sense the level of light diffusely reflected from the interior surface of the hemisphere;

    -- the imaging assembly comprising:

    (ii) a photodetector array, the lens focusing an image of the object onto the photodetector array, each photodetector in the array creating an electrical signal representative of the light reflected from the front surface of the object, the photodetector array being connected to the computerized image processing assembly.

    2.   Claims 1-18 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.

-------------------- NEW CITATIONS --------------------

CLAIMS

What is claimed is:

1. A method for measuring the degree to which a printed image on a first side of a sheet is visible when illuminating and viewing a second side of the sheet, the method comprising:

a) creating a calibration image of a reference object containing no image by illuminating the reference object at an initial illumination level;

b) determining an average gray level of the reference object and adjusting the illumination level to achieve a predetermined average gray level;

c) illuminating the sheet at an initial illumination level the same as that used to create the calibration image and creating an image of the sheet;

d) measuring the ratios of the pixel intensities of the image of the sheet with the corresponding pixel intensities of the calibration image; and

e) calculating a mean value of the ratios of the pixel intensities.

2. An image analysis method for characterizing the showthrough of a printed image on the reverse surface of a substantially planar sample object having a reflective front surface, by measuring the optical reflectance of the front surface with a lens and a photodetector array, the method comprising:

(a) creating a frame-averaged dark current image representing the response of the photodetector array in the absence of light;

(b) uniformly illuminating, with a diffuse light source, the front surface of a reference object, said reference object having no image on its reverse, and creating a calibration image of the reference object, comprising the steps of ;

(1) illuminating the front surface of the reference object with the diffuse light source, the output of the light source being set to an initial illumination output level;

(2) creating a frame-averaged image of the front surface of the reference object;

(3) determining the average gray level in the image of the reference object created in step(b)(2);

(4) adjusting the illumination out put level by adjusting the output of the light source and repeating steps (2) and (3) until the

18

AMENDED SHEET

average light level reflected by the front surface of the reference object causes an average gray level in the image of step (2) to be within a
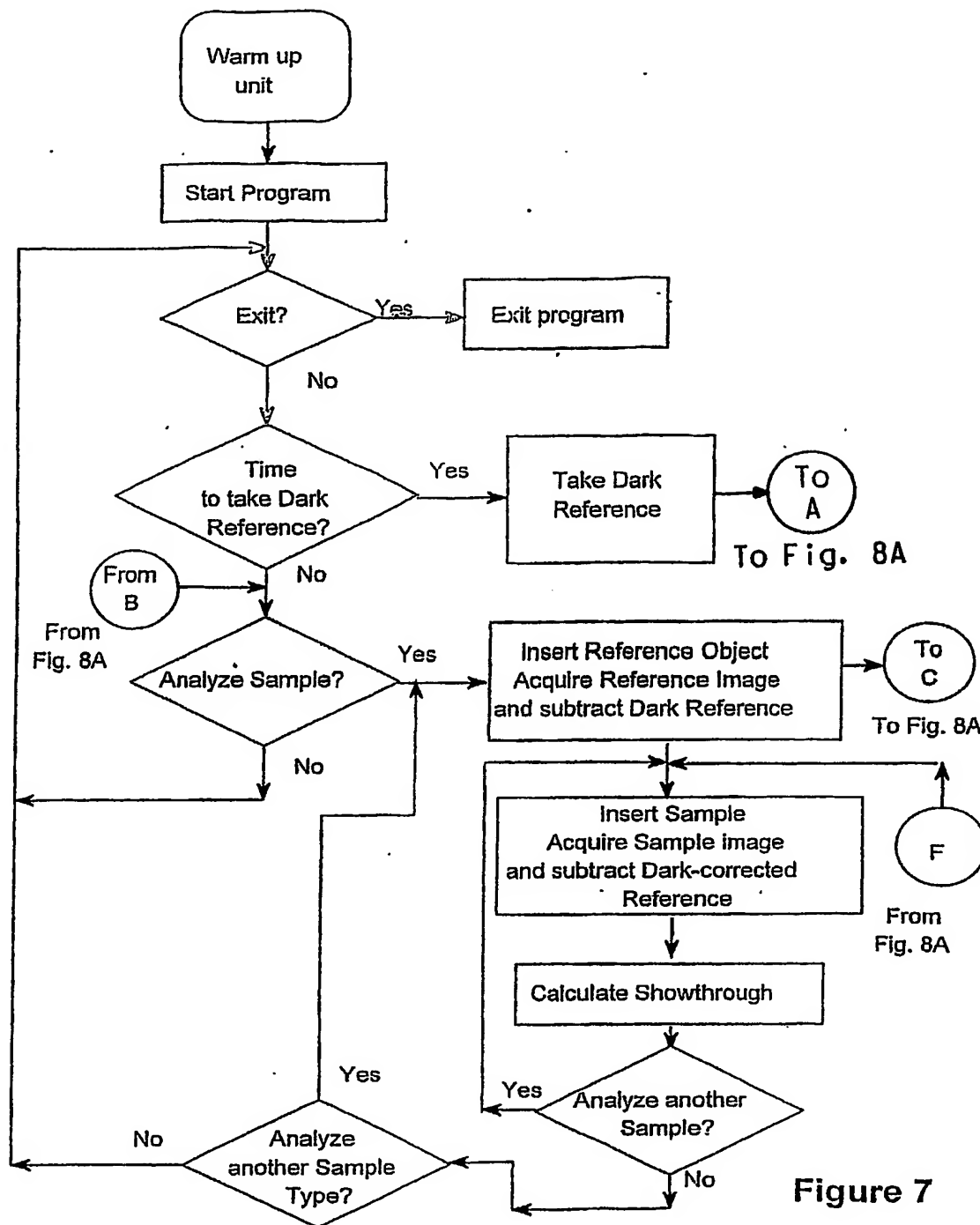
Warm up
unit

Start Program

Exit? — Yes → Exit program

No

Time to take Dark Reference? — Yes → Take Dark Reference → **TO A**

To Fig. 8A

From B

No

From Fig. 8A

Analyze Sample? — Yes → Insert Reference Object Acquire Reference Image and subtract Dark Reference → **To C**

To Fig. 8A

No

Insert Sample Acquire Sample image and subtract Dark-corrected Reference

F

From Fig. 8A

Calculate Showthrough

Analyze another Sample? — Yes → ...

No

Analyze another Sample Type? — Yes → ... No → ...

Figure 7